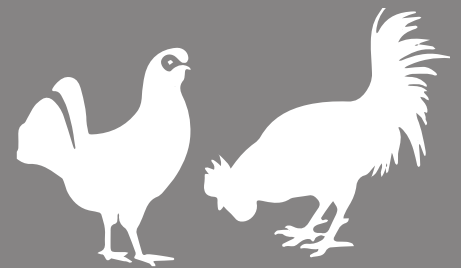


# Nutrition for the Backyard Flock

Revised by Justin C. Fowler,  
UGA Cooperative Extension Poultry Scientist

Everything that an animal or plant does to take in and use its food is what we term nutrition. For any animal to carry on its necessary life functions, as well as to grow and be able to produce food for humans, there are specific chemical compounds that must be in their diet in the right amounts. This is because no animal is capable of producing every one of the necessary components on its own.

The study of nutrition is about understanding that there is no “perfect” food, or no one ingredient that contains every nutrient an animal needs in the exact concentrations it needs it. Providing the right nutrition for your chickens means ensuring that what they eat supplies all of the essential amino acids, fatty acids, carbohydrates, vitamins, minerals, and water that they will need to produce the meat or eggs you hope to collect.



## Energy

The first need of all life is for energy. Without the calories necessary to fuel all of the chemical reactions going on, we needn't ever worry about the individual building blocks that are used (the vitamins, minerals, amino acids, and other things). Calories come from three major nutrient classes: carbohydrates, fats, and proteins.

## Carbohydrates

Dietary carbohydrates can come alone (glucose or fructose), in pairs like sucrose (table sugar) or lactose (dairy sugar), or can come in larger forms like plant starch or cellulose. Carbohydrates are used as a quick source of energy and are a required fuel source in all cells.

Carbohydrates make up the biggest component of a poultry diet. They come from the cereal grains (corn, wheat, sorghum, barley, rye, millet, etc.) and include digestible carbohydrates like starch, as well as ones that are non-digestible (such as cellulose). Cellulose and other complex, indigestible carbohydrates are



UNIVERSITY OF GEORGIA  
EXTENSION

classified on a feed label under the term “crude fiber.” These molecules may have important roles in intestinal health, but too much of them can reduce a bird’s growth and give them a higher susceptibility to intestinal problems.

## Fat

Dietary fats come in the form of triglycerides, which are made up of three fatty acids attached to a glycerol backbone. The fatty acids are essentially a long chain of carbon and hydrogen that have a high energy density per unit weight and make up the body’s long-term storage of calories (think hydrocarbon fuels like propane, ethanol, or gasoline).

Fat, in the form of animal fats or vegetable oils, is used as a concentrated source of calories in a diet. Diets for meat-type birds, for example, will contain over 3,000 kcal per kilogram (1,364 kcal per pound). Getting that many calories is not feasible without the addition of a fat source. Fats also aid in the absorption of important fat-soluble vitamins, as well as improve the handling qualities, palatability, and pellet quality of a feed. The body can absorb fats without expending any energy, so substituting calories from carbohydrates with calories from fat is sometime done in warm-weather months to keep birds from feeling over-heated.

Fatty acids also have an important role in human health. Having too many of a certain type of fatty acids instead of another type (omega-6 versus omega-3 fatty acids) has been implicated in cardiovascular disease, rheumatoid arthritis, and cancer. Importantly, the fatty acids in the yolk of an egg can be influenced by the fatty acids in the diet of a laying hen. Ingredients such as flaxseed, camelina, and fish meal have high levels of omega-3 fatty acids, which can be packaged into the egg by the laying hen.

## Protein

The protein content of a feed is listed on the label as “crude protein,” which is a measure of the nitrogen content. Proteins are large molecules that are built by arranging 20 different amino acids. The bird’s biological need is for these individual amino acids. A bird is able to make 10 of these amino acids from other compounds, but the other 10 must be present in the proteins of their feed ingredients, so they can make all of the chicken proteins they need to live and grow.

No single ingredient has all of the necessary amino acids in the right amounts for chickens. However, when we mix ingredients like corn and soybean meal, the result begins to approach a good balance for the necessary amino acids. The amino acids most likely to be deficient for a chicken eating a corn/soy-based diet are methionine and lysine. These amino acids typically appear on a feed label and should make up approximately 2% of the crude protein value for methionine and 5% for lysine. Luckily, there are purified, crystalline sources of important amino acids available for use in animal feeds. Adding purified amino acids (instead of just adding more soybean meal) prevents over-feeding all of the other amino acids, which causes nutrient waste.

## Vitamins

All of the chemical reactions that are needed for an animal to take carbohydrates, fats, and protein and use them to sustain its life require a group of chemicals called vitamins. Some of these chemicals are fat-soluble: vitamin A, necessary for proper vision and reproductive health; vitamin D, used in bone formation and calcium metabolism; vitamin E, a biological antioxidant; and vitamin K, required for proper blood clotting. The B-complex vitamins, which are water-soluble, are involved in all of the body’s energy metabolism reactions. Chickens are able to make their own vitamin C, so there is no need to supplement it in their diet.

Vitamins are naturally found in different combinations and in varying concentrations in any feed ingredient. However, no one ingredient has the perfect blend of all of the vitamins, and there are variations in these amounts from one batch of an ingredient to another. Therefore, the chicken’s full requirement is typically met by including a vitamin premix in the diet (just like humans taking a multivitamin every morning).

## Minerals

The “ash content” of the feed is the inorganic mineral portion. Minerals are used by the chicken for bone formation (calcium, phosphorous, and magnesium), for electrolyte balance in the cells (sodium, potassium, and chlorine), and in trace amounts for chemical reactions (zinc, manganese, iron, copper, selenium, and iodine).

Grains are generally low in essential minerals, so supplementing the diet is necessary for optimal performance. Calcium, phosphorus, and salt are needed in the highest amounts. Calcium (which can be provided by limestone, oyster shell, or meat and bone meal) is especially important for proper skeletal formation, as well as for eggshell formation in laying hens.

Most of the phosphorous in plants comes in a form that animals cannot use (called phytate). That is why it is important to supplement the diet with inorganic forms such as dicalcium phosphate or meat and bone meal. When selecting feed, it is best to pay attention to what's labeled as the "available phosphorous" (which is the phosphorous not tied up in the phytate molecule).

## Water

Poultry feed is typically 10% moisture, whereas their meat has 65–70% moisture and eggs have 75% moisture. That water has to come from somewhere, so water should never be overlooked as an essential nutrient since it is needed for every biological function.

All birds should have plenty of access to cool, clean drinking water. Also, keep in mind that water intake is tied directly to feed intake (birds will typically drink about twice the amount they eat), and birds will not eat if they cannot drink. Water is also used by the chicken to cool off their body when they are panting (just like us sweating). Without adequate water, they are not able to cool their body down during heat stress.

## The Right Diet for the Right Bird

The most common mistake in feeding poultry can be as simple as feeding the wrong feed. For example, calcium levels in a layer feed will be upwards of 4%, which if fed to a young broiler (a meat bird) can lead to leg abnormalities and even death. Also, growing broilers require as much as 23% protein, whereas laying hens and finishing broilers may only need 17–18% (Table 1).

**Table 1. Typical Nutrition Concentrations for Various Types of Poultry**

	Protein (%)	Methionine (%)	Lysine (%)	Calcium (%)	Avail. Phos. (%)	Fat (%)	Fiber (%)
<b>Broiler</b>							
Starter (1–3 weeks)	22	0.50	1.30	0.95	0.45	5.0	2.5
Grower (4–6 weeks)	20	0.45	1.15	0.90	0.40	5.5	2.5
Finisher (7+ weeks)	18	0.35	0.95	0.85	0.35	6.0	2.5
<b>Pullet (young hen)</b>							
Starter (1–6 weeks)	20	0.45	1.10	1.00	0.45	4.0	3.0
Grower (7–18 weeks)	17	0.35	0.80	0.95	0.40	4.0	3.0
<b>Laying Hen</b>							
In production (19+ weeks)	16–18	0.35–0.45	0.75–0.85	3.50–4.50	0.35–0.50	4.0	3.0–4.0

*Note: Scratch feed should never be fed as a complete feed for any type of bird.*

Whenever you are purchasing feed, it is important to know:

- What kind of bird are you feeding?
- What age are your birds?
- Why are you raising them?

The answers will guide you to the appropriate feed for your flock.

Feed for all meat-type birds will be pelleted. Doing so results in about a 4% improvement in feed efficiency, which equates to about 2 lb more meat for every 100 lb of feed. Diets for starting broilers will be a “crumble,” which is just the pellets after passing them through a roller mill. Feed for egg-laying birds most often comes as a mash (no pelleting process), though crumbled diets can be used to encourage feed intake during hotter months.

Scratch feed should not be considered a complete feed for any type of bird. Simply a collection of cracked grains, it does not have a complete balance of any of the nutrients a chicken needs to live. It should only be thrown out as an occasional treat for the birds. It also should never be mixed with a complete formulated diet. Doing so causes a nutrient imbalance in the total diet of the birds, increasing the calories while reducing the protein, vitamin, and mineral content.

## Conclusion

We are surrounded by a vast array of nutrients that go unused for human nutrition. Many food co-products such as dried distiller's grains, bakery waste, or oilseed meals, as well as by-products of animal agriculture like meat and bone, blood, or feather meal all have nutritional value, but they are the sort of things that humans won't eat. By raising chickens, we are able to take what are (to us) inedible ingredients and transform them into lean meat and nutritious eggs. The birds are capable of using their metabolism to break the nutrients in these feed ingredients down to their individual pieces and reassemble them into something that we enjoy eating. This is only possible if we provide them with all of the nutritional building blocks necessary for the job.

Animal feed may be the major expense in animal production (about 70% of the total cost), but providing your flock with a well-balanced diet and plenty of cool, clean water means you will be able to receive back from them the maximum supply of fresh eggs or nutritious meat.

*This publication was originally authored by Larry Vest and Nick Dale, Department of Poultry Science, and published as Leaflet 396.*

**extension.uga.edu**